

Answer on Question#55191 – Chemistry – General Chemistry

Question:

What is the concentration of Br⁻ (aq) in a solution prepared by mixing 75.0 mL of 0.62 M iron (III) bromide with 75.0 mL of water? Assume volumes are additive. The answer is 0.93 but I got 1.86 and 3.1 I'm not even sure anymore!

Solution:

v – The number of moles (mol);

V – The volume (L);

C – The molar concentration (mol×L⁻¹);

$$C = \frac{v}{V};$$

$$V_1 = 0.075 \text{ L}; \quad C(\text{FeBr}_3) = 0.62 \text{ M};$$

$$v(\text{FeBr}_3) = C(\text{FeBr}_3) \times V_1;$$

$$v(\text{FeBr}_3) = 0.62 \times 0.075 = 0.0465 \text{ mol};$$

The molecule of FeBr₃ contains 3 Br⁻ ions. According to this statement: $v(\text{Br}^-) = v(\text{FeBr}_3) \times 3$;

$$v(\text{Br}^-) = 3 \times 0.0465 = 0.1395 \text{ mol};$$

$$V_2 = V_1 + \Delta V; \quad \Delta V = 0.075 \text{ L}; \quad V_2 = 0.075 + 0.075 = 0.15 \text{ L};$$

$$C_2(\text{Br}^-) = \frac{v(\text{Br}^-)}{V_2};$$

$$C_2(\text{Br}^-) = \frac{0.1395}{0.15} = 0.93 \text{ mol} \times \text{L}^{-1};$$

$$C_2(\text{Br}^-) = 0.93 \text{ mol} \times \text{L}^{-1};$$

Answer: 0.93 M;